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ABSTRACT

A Swedish Research on Higher Education project to investigate relationships between knowledge and educational certification is described. The first study involves several cohorts of engineering students from technological universities in Paris, Stockholm, Zurich, and Berlin for the period 1880-1960. Attention is directed to students' educational performance and careers. The empirical base is designed to promote discussion of important theoretical problems about the nature and implications of professionalization in a historical perspective. A theory that educational systems and social change are linked will be evaluated. According to the theory, rapid social change (i.e., technological change and new modes of production) will result in a gap between social needs and education. As a consequence, certified competence will be less valued than quality of knowledge. The second study will investigate workplaces, specific work processes, and educational conditions to assess the extent to which occupational status has been determined by knowledge or certified competence. Comparisons will be made between different workplaces and occupational groups. (SW)

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NEW PROJECT

TITLE OF PROJECT: KNOWLEDGE AND EDUCATION. ONE HUNDRED YEARS OF CERTIFIED COMPETENCE

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SUMMARY

This investigation, which is part of the Swedish Research on Higher Education programme, is divided into two parts, the first of which is the only one currently in progress. A number of student cohorts from technological universities in Paris, Stockholm, Zurich and Berlin from the period 1880-1960 are investigated as for their educational performance and their careers. From this empirical basis the project intends to promote discussions of important theoretical problems about the nature and implications of professionalisation in a historical perspective. Has certified competence meant the same thing for all those who have been educated at the technological universities or has their qualitative achievements in their studies meant something for their future career? Have there been differences in these respects between the countries under investigation? Have differences occurred over the period of investigation? The latter question has a wide importance. The project is intended to probe a theory advanced by the project leader that educational systems and social change are related to each other in mutual exchange. This would mean that rapid social change (in this case technological change and new process of production) causes a gap between social needs and education. As a consequence certified competence should be less valued than quality of knowledge. After a time-lag the educational system will have covered the gap and certified competence may be re-evaluated. Some other theoretical statements relating to the periodisation of professionalisation will also be tested.

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M S Larson's theory of a specific periodisation of professionalism is important as a point of departure for this analysis and they have given rise to a lively debate on the relation between professionalisation and bureaucratisation and to labour processes in general. In all these respects the project ought to be able to produce relevant contributions from its field of investigation.

DESCRIPTION OF THE PROJECT

The relationship between knowledge and certification of competence is a very important field of research concerning the role of higher education in society. The education system has been intended and designed to confer knowledge of use in the practice of a certain profession or some other particular activity (e.g. research), but at the same time it has been designed to provide a certain certification of competence demanded first by the State and, subsequently, by society in general. The role of universities and colleges in this context has yet to be investigated, although the professionalisation processes involved have attracted attention from various quarters.

Although in my belief there are extensive subsidiary questions which remain to be explored concerning the relationship between knowledge and education prior to the breakthrough of capitalism in Swedish society, I would above all emphasise the importance of the knowledge-education relationship in the period post-dating the arrival of industrial capitalism. It was industrial capitalism that brought about a genuinely occupational division of the members of society, and it was in the society of industrial capitalism that one group after another sought to delineate itself by means of organisational and educational certification - "the professionalization of everyone", as Harold Wilenski put it in a celebrated essay on professionalisation tendencies (Wilenski 1964-65).

Theoretical and conceptual approach

The starting point of this inquiry is the theory which I have previously launched (in an Editorial and an article in the Scandinavian Journal of History) that a definite relationship exists

between society's education system and its economic structure, so that changes in the latter impose strains on the capacity of the former to supply enterprise with suitably trained and educated people. In times of rapid change, therefore, a personnel demand arises which is not covered by the "output" of the education system. Thus persons with certified competence as understood within the education system are not available. Demand, accordingly, comes to focus on knowledge instead of certified competence in the form of education. At the same time, however, demand appears for a changed educational structure, since it is the task of the education system to provide society with adequately trained labour. The system therefore changes in response to demand. If a structural change in the economy becomes permanent, a new and better balance is eventually achieved between the education system and the needs of society. This makes it possible once again to give pride of place to considerations of competence rather than cognitive demands in the informal sense.

Thus the present project is mainly concerned with questions connected with the relationship between actually acquired capacity (be it theoretical or practical) to solve certain problems and an acknowledged, possibly certified competence to solve such problems. As an initial hypothesis, the relationship between these states is assumed to be open-ended: somebody with actual capacity may also have certified competence, but need not necessarily do so; a person with certified competence may also have de facto capacity, but not necessarily. I have ventured into this complex of problems in a number of previous works (Torstendahl 1975, Torstendahl 1979, Torstendahl 1981). The definition of knowledge I have given above is the one I have employed in the works referred to. From this it also follows that occupationally relevant knowledge is the capacity to solve practical and theoretical problems posed by the practice of a certain occupation.

The requirement of occupationally relevant knowledge has risen steeply during the period following the rise of industrial capitalism to the position of dominance within the country's economic structure. Universities and colleges have had their appointed

task in meeting progressively more exacting requirements, but the question is for how long during the processes of industrialisation and bureaucratisation occupationally relevant knowledge could equally well be acquired through professional practice as through special training (e.g. in the case of production line engineers, managers and sales executives). Many accounts take it for granted that an evolution of this kind from informal to formal education has occurred, and various persons with a knowledge of actual conditions in Swedish industry have stressed that this development took time and in some cases was a long time coming. (Karl-Gustaf Hildebrand has often stressed this point when speaking on the subject; Boel Berner refers to it cursorily as a fact, most recently in Berner 1983, p. 180).

The Knowledge-Education project is not intended to cover the full scope of this relationship. Attention will be confined to certain problems which are directly related to processes of industrialisation and bureaucratisation.

Previous research and its relevance to the project field

Little work has been done previously in the field which this project is aimed at investigating. Special attention should be drawn to a few works dealing in general terms with the relationship between education systems and social change (above all Ringer 1979) and, in particular, the recently published account by Konrad Jarausch concerning the interaction between professionalisation process and social change (Jarausch 1983).

The focus on the historical process of change in society constitutes one of the important changes of direction that have taken place in professionalisation research. Jarausch attributes vital importance to higher education and related opportunities for the profiling of particular educational groups as a factor in the social development of the past century. What is perhaps most important, is his attempts, on the basis of empirical data, to compare conditions in various European countries and the USA and in doing so he has refrained from any hard and fast line of

demarcation between different political systems. It is obvious that the theory of professionalisation in this broad sense has a great deal in common with the theory of bureaucratisation (see also Gesser 1984).

In connection with professionalisation, attention should also drawn attention to the research into Bildungsbürgertum which has recently been done in Germany and has generated two major collective works. Bildungsbürgertum is associated there with a German road to professionalisation, and the important point here is that made by Jürgen Kocka, namely that Bildungswissen (as a form of knowledge in Weber's sociology) can be variously combined with Leistungswissen and Herrschaftswissen. Leistungswissen is the typical knowledge of the professionals. Nowhere, however, do these forms of knowledge occur in isolation.

The ideas developed by Kocka on the subject of Bildungsbürgertum and its relation to bureaucrats and professionals can very well be elaborated into a more comprehensive historical theory of professionalisation. Work of this kind is in fact under way, and I am taking part in it myself together with Jarausch, Kocka and a number of other historians, sociologists and political scientists. This work impinges directly upon the work planned for the Knowledge-Education project. The forms and functions of competence certification in society have changed over the past hundred years with the formation and establishment of professional groupings. The process of social change, therefore, cannot be overlooked.

Magali Sarfatti Larson is the sociologist who above all has introduced a perspective of historical change into professionalisation research. Her period classification focuses on two phases. The first of these involves what I would term "classical" professionalisation, i.e. the organisation of groups active in a particular professional sphere with a view to controlling that sphere through their monopoly of professional knowledge. This is a question of achieving collective social mobility, i.e. elevating the status and remuneration of a profession within a

given social framework. During a second phase a corresponding process takes place on different premisses. With the arrival of corporate capitalism (the new phase of industrial capitalism which took root in the USA between about 1870 and 1890 and in Europe at roughly the same time) both previously organised and new educational groups came above all to be incorporated in working life through bureaucratic organisations, whether private and industrial or public. Subsequently the new strategy of professionalism came to involve the use of bureaucracies as an instrument of collective mobility (Larson 1977).

Larson's argument is open to two important objections. Firstly, she disregards a non-Anglo-American experience whereby a different part is played by the state, and secondly she disregards developmental tendencies within the society of industrial capitalism after 1890. And yet one is bound to concede that her work has had an epoch-making effect on modern professionalisation research. The scene was previously dominated by a functionalist approach which had been established by Parsons (Parsons 1963) and elaborated by Wilenski (Wilenski 1964). This approach came to be developed in almost unhistorical form but with great aplomb by sociological researchers all over the world.

There is a tendency at present to dichotomise the literature into two groups, viz an earlier part typified by Wilenski and his supporters and opponents during the 1960s, and the younger part characterised above all by Sarfatti Larson and her supporters and opponents (Cullen 1978, Saks 1984). This approach has its limitations. Using it one tends to forget that one approach has been assiduously employed in both research traditions, namely the question of the relationship between the professional groups and bureaucratic organisations (e.g. M. Durand and Sarfatti Larson). Several different answers have emerged on this subject and it is not immediately apparent that Magali Sarfatti Larson and her allies have contributed any radical new approach in this respect (cf. Torstendahl 1982 and Torstendahl 1984). As regards not least the professionalisation of engineers and technologists, the relationship with bureaucracies (administrative units) is very

important both in industry and elsewhere (Torstendahl 1975, Runeby 1976, Berner 1980, McClelland 1983).

There is no doubt, however, that what is taken to be a more recent departure of professionalisation research can rightly be said to have deepened and revitalised the issue of the relationship of the professional groups to competence and the acquisition of knowledge. To Sarfatti Larson and others, the monopolisation of competence implies a bid to monopolise the acquisition of knowledge with assistance from the state and the attainment in this connection of a point where knowledge and competence tend to merge within the monopolised field. This is the essential question with which the Knowledge-Education project is concerned: can one pinpoint a field of this kind in which monopolisation has been so effective that knowledge and competence merge into one? The present project is also concerned with inquiring whether these ideas have to be made more articulate, considering that knowledge (professionally relevant knowledge) is indeterminate and must be conceivable as occurring to different degrees.

Procedure

One basic topic of inquiry in the research project aimed at investigating the relationships between knowledge and education certification in working life must be in what fields and with what aids (operationalisations) the inquiry is to proceed. The intention is for this project to be conducted in the form of two sub-inquiries, one of them concerning technologists with a certain educational background in their careers, and the other concerning technologists in their work at a particular workplace. The former field has been chosen primarily because it permits an operationalisation whereby comparisons can be made over time and space. The intention is to use both types of comparison, viz in time for the period 1890-1970, and in space for Sweden, France, Switzerland and/or Germany/West Germany. The other field is less amenable to study through exact operationalisations of knowledge and competence/education, but within fairly generous limits it should be possible to analyse the role of education versus know-

ledge for persons in various positions at each of a couple of workplaces.

Thus the intention is to enter various fields of application in order to take a closer look at the relationship between knowledge and education in practice. One of the most important applied fields for an examination of this kind will comprise qualified engineers in various countries. Knowledge, measured in certification terms, will be compared with professional careers, measured in terms of a few categories, by means of comparative study of engineers trained at the Royal Institute of Technology in Stockholm, Ecole centrale des arts et manufactures in Paris and either Eidgenössische Technische Hochschule in Zurich or Technische Hochschule/Technische Universität in Berlin. A study of this kind serves the important purpose of testing the initial hypotheses (concerning an open-ended relationship between knowledge and education/competence) by means of a number of quantifiable variables, even though the relationship between the empirical and theoretical levels is of course debatable and will have to be penetrated in detail. If careers appear unaffected by the credential level, the importance of educational competence will not be confined to negotiating a threshold. If, on the other hand, careers are found to be differentiated in a readily observable manner in relation to the credential level, it should also be possible to draw conclusions regarding the way in which the credential level affects career differentiation. Of course, one cannot guarantee that it will be possible to study the full impact, but at least some grounds will be obtained for theories concerning the decisive importance of knowledge in certain career conditions.

The plan is for the second main study of the project to be undertaken by another researcher. The purpose of this second study will be for a couple of workplaces to be investigated so as to make it possible, through an intensive study of work processes and educational conditions, to discuss the extent to which occupational status has been determined by knowledge or certified competence. Comparisons will have to be made here between dif-

ferent workplaces and occupational groups, and the investigation should also incorporate an historical perspective, so as to make it possible to examine the impact of professionalisation processes and possible monopolisation tendencies in favour of persons possessing such competence. It should be added that the project Bureaucratisation Within the Public Administration and Private Enterprise in Sweden After 1870 (headed by myself together with Karl Molin and Thorsten Nybom) includes a related investigation, conducted by Per Carlson, of salaried careers and the white-collar labour market with reference to the educational factor.

Materials and timetable

A fixed timetable only exists for the first sub-investigation, in which it is planned to use material concerning engineering graduates from the Royal Institute of Technology (KTH) in Stockholm, ECAM in Paris and either ETH in Zurich or TH/TU in Berlin (possibly combined with TH in Hanover) to shed light on the internal ranking order of the engineers as regards their respective professional credentials, to ascertain whether these ranking orders were similar among students at all the various educational establishments selected, and to see whether the introduction of new technology and new production processes leaves any mark on the correlation between credentials and careers. The inquiry is intended to take the form of a cohort study. Roughly every tenth student year will be investigated, but since classes vary in size, it will be necessary in certain cases to amalgamate two or more classes so as to place the inquiry on an adequate footing. Similarly, study programmes and the breadth of educational opportunities vary from one establishment to another, with the result that only certain central programmes can be selected from certain establishments, for the same of comparability.

The basic assumption underlying the inquiry is that professionally relevant knowledge can be approximately operationalised in terms of educational credentials. This being so, certified competence consists in the fact of the individual concerned

holding a certificate from his educational establishment. Interestingly enough, ECAM in Paris distinguished at one time between diploma and certificate, a certain number of marks being stipulated for the former. The intention, obviously, was to avoid the effect whose existence this project is designed to ascertain or disprove, viz a diploma doing more to influence the engineer's professional career than the quality of the knowledge acquired as a result of teaching.

Career conditions must also be operationalised in order to be susceptible of investigation, since not all professions are immediately comparable with one another. A preliminary classification into four dimensions has been tested (with reference to my previous investigations in Torstendahl 1975). These dimensions are aimed at pinpointing branch of enterprise, type of enterprise, professional character and professional status in a number of rough categories. It should be possible to impart realistic meaning to career conditions through combinations of these dimensional categories.

As regards the changes in social conditions to which the inquiry is also to refer, a point of departure should be available in the discussion concerning the social development of industrial capitalism which has emanated from the German discussion of organised capitalism. In concrete terms I intend to proceed from the four-phase model which I devised as a contribution to that discussion (Torstendahl 1984).

The possibilities of conducting the inquiry along the operational lines indicated will of course depend entirely on the availability of satisfactory material. Before the project was outlined I had already investigated the stock of material at ECAM in Paris and KTH in Stockholm. This revealed that the ECAM material would undoubtedly be amenable to processing on the terms which the study required and that the KTH material would be equally amenable if career data could be adequately supplemented.

The information available during the planning stage (concerning TH/TU in general, Rürup 1978) also indicated that the material from TH/TU in Berlin would furnish an adequate basis for the investigation of credentials and that printed catalogues from Verein Deutscher Ingenieure (VDI) could provide an adequate framework for career data concerning these engineers. Data conditions in Berlin have subsequently proved to be less favourable than expected. All examination records from TH in Berlin (for the pre- and inter-war years) were destroyed during air raids in the closing stages of the Second World War. The enrolment and graduation records still extant cannot make good this loss, because they do not provide any summaries of marks awarded and do not even afford an opportunity of deciding whether the individual student completed his studies or curtailed them without graduating. Credential data are only available for the post-war years, and even these are hard to get at owing to German data secrecy legislation. The opposite applies to career data for the German engineers; they are listed in printed catalogues for the inter-war years, but they are not readily available after 1957, when VDI ceased publishing such data in its printed registers. Further processing will therefore require the benevolent co-operation of VDI and the individual concerned.

Certain data have been collected for the survey cohorts at TH/TU in Berlin, but it is doubtful whether adequate material coverage can be attained. Consequently there is cause to consider an alternative strategy. One possibility is to supplement the material from TH in Berlin with material from TH in Hanover. Technische Hochschule in Berlin was for a long time a European centre for certain kinds of advanced technical education. Swedish engineers continuing their studies abroad chose not infrequently to do so at TH in Berlin. TH in Hanover did not occupy any such position. Apart from Berlin, Ecole polytechnique in Paris (with its heavy focus on national government service) and ETH in Zurich were the leading institutes of technology. ETH was a fairly old-established institution and acquired a firm reputation during the 19th century as one of the foremost institutions of its kind, although standards do not appear to have been en-

tirely consistent (ETH 1855-1955). It is hard to tell whether educational quality during the inter-war years still measured up to this fame, although the presence of several Nobel laureates among teachers and students bears witness to a high quality of research (ETH 1955-1980, p. 577 et seq.), but there is no doubt that the Zurich establishment was one of those which Swedish and other foreign students preferred to enter when proceeding to study outside their own countries. Between 1930 and 1979, however, there were "only" 38 Swedish students, while the Norwegians - the largest foreign group, even outnumbering the Germans - totalled 632 (ETH 1955-1980, p. 673). There may therefore be good reason to supplement the ECAM and KTH materials by means of material from ETH in Zurich. According to available reports, that material is fully available and affords opportunities of studying both careers and credentials. There is, however, reason to suppose that the labour market for Zurich students was not the same as for Berlin students. True, the German labour market admitted many people with Swiss qualifications, but Swiss enterprise was far more dependent than its German counterpart on small businesses. A difference of this kind would only prejudice the outcome of our inquiry if the proportion of self-employed persons among the Swiss students was higher than in other places.

Rolf Torstendahl
1985-03-20

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